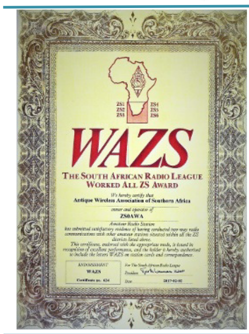
Newsletter

The Antique Wireless Association of Southern Africa

149

December 2018

A Member of the SARL



Inside this issue:

AWA Committee:

Reflections:

Having attended all of the AGM's since the inception of the AWA, it was a privilege to be at this most recent one.

Once again, the value of Antique Radio has shown itself to be something which is instilled in many of the hams, both young and old.

How well I can remember the first AGM which was held at the Rand Airport on the site of the present SAA museum, in the restaurant.

The AGM started off being called an Open Day, with displays of antique radio, a flea market and then the AGM meeting itself.

Prior to this first actual meeting, the election of a chairperson and a committee was done on air at one of the SSB nets held on a Saturday morning.

If my archives are correct, the first actual get together was held in 2007 and was arranged and setup by Allan Franzen ZS6BIK (sk).

The flea market was an outdoor event with tables laid out in the front garden area of the establishment and was well attended for a first AWA get together.

After that, the Rand Airport venue became a favourite and was held there up until the closing of the restaurant.

The next two or three years we had the use of the KARTS (Kempton Park) venue, sharing in their flea market and open day.

It was after this that Richard, then ZS6TF, got himself involved with the SAIEE in observatory. Richard of course being a member of the SAIEE saw an opening to assist in helping to get the museum up and running in the then newly refurbished Innes House.

This of course led to close ties between the AWA and the SAIEE with a few members getting involved with Richard to assist in the museum and of course setting up the ZS6IEE shack and equipping it.

The last few years that we have held the AGM there, since 2015, the attendance has improved every year. Certainly the venue has played a large part in this as our members so enjoy looking through the displays at the museum.

There has been a suggestion to have the next one at a venue where people from the rest of the country can attend. Perhaps Bloemfontein or somewhere in the middle of the country. Your views would be appreciated.

Best 73

DE Andy ZS6ADY

WIKIPEDIA

Modes of communication:

Double-sideband suppressed-carrier transmission (**DSB-SC**) is transmission in which frequencies produced by amplitude modulation (AM) are symmetrically spaced above and below the carrier frequency and the carrier level is reduced to the lowest practical level, ideally being completely suppressed.

In the DSB-SC modulation, unlike in AM, the wave carrier is not transmitted; thus, much of the power is distributed between the side bands, which implies an increase of the cover in DSB-SC, compared to AM, for the same power use.

DSB-SC transmission is a special case of double-sideband reduced carrier transmission. It is used for radio data systems.

DSB-SC is basically an amplitude modulation wave without the carrier, therefore reducing power waste, giving it a 50% efficiency. This is an increase compared to normal AM transmission (DSB) that has a maximum efficiency of 33.333%, since 2/3 of the power is in the carrier which conveys no useful information and both sidebands containing identical copies of the same information. Single Side Band Suppressed Carrier (SSB-SC) is 100% efficient.

HF Happenings:

IARU Region 1 - December 2018 YOTA Month

December is YOTA Month when several youngsters from IARU Region 1 Member Countries will become active on the air with YOTA as suffix in the call signs. From Saturday 1 December to Monday 31 December 2018, young amateurs in their teens and early 20s will attempt to make many contacts worldwide with each other during this international event. This event is aimed at our young generation and is a golden opportunity for clubs to get youngsters who are interested in or want to find out more about Amateur Radio on the air.
It is not a formal contest, but a way to get our current young amateurs on the air contacting hundreds of other youngsters around the world. The SARL has registered a special call sign ZS9YOTA on the IARU Region 1 website as an educational call sign for use by clubs and individuals during December. To reserve a slot to use the ZS9YOTA callsign on a daily basis or for information please contact Noel, ZR6DX via e-mail at zr6dx@iafrica.com or alternatively to Nico, ZS6QL at zs6ql@mweb.co.za. The schedule and applicable rules will be available on the SARL website.
All radio amateurs are welcome to enjoy a QSO with the youngsters, be aware that some of them are new to the radio hobby, while others are more experienced. Looking forward to hearing our younger generation on the air during December .
The Youngsters on The Air group will be active again during the entire month of December. The idea for this event is to show the amateur radio hobby to youth and to encourage youngsters to be active on the ham radio waves. Announced participating stations include 4O18YOTA, 5H3YOTA, 6V1YOTA, 9A18YOTA, AO1YOTA, AO5YOTA, AP3YOTA, DF0YOTA, EG2YOTA, ET3AA, GB18YOTA, HA6YOTA, HB9YOTA, HG0YOTA, II3YOTA, II5YOTA, LY5YOTA, OE0YOTA, OH2YOTA, OL18YOTA, OM18YOTA, ON4YOTA, PA6YOTA, PD6YOTA, R18YOTA, SH9YOTA, TF3YOTA, TM18YOTA, WK1DS/YOTA, YT18YOTA, YU18YOTA, Z30YOTA, Z39YOTA, Z60YOTA, ZL6YOTA and ZS9YOTA.
QSLs via Club Log's OQRS or direct to M0SDV. Information on the event and the awards can be found at https://events.ham-yota.com/

Two New SOTA Associations

From 1 December 2018, Namibia with 2 719 summits and the Prince Edward and Marion Islands with 2 summits have joined the SOTA programme.

Calendar:

December
1 – World Aids Day; start of YOTA December
1 and 2 - Linden Market, Johannesburg
2 to 10 – Hanukkah
3 - International Day for People with Disabilities
7 - International Civil Aviation Day
8 and 9 - ARRL 10 metre contest
10 – Closing date for Newbie logs; International Human Rights Day
11 – International Mountain Day
12 – all schools close
12 to 22 – Ek Lief Krismis Market, George
14 to 16 – Gabrielskloof Favourite Things Market, Overberg
14 to 23 – Parys Christmas Market, Parys
14 to 30 Trail of Lights, Durban
16 – Day of Reconciliation; Groote Post Christmas Market, Darling
17 – Public Holiday
21 - Summer Solstice
21 and 22 - Full Moon Hike, Stellenbosch
25 - Christmas Day
26 - Day of Goodwill/Family Day; the closing date for the January 2019 Radio ZS
29 and 30 - Unplugged62 Festival, Barrydale
31 - Festival of Lights, Nieu-Bethesda;
The end of the2018 YOTA Month, the 2018 CQ DX Marathon and the ARRL Grid Chase.**Destroy your copy of the 2018 Contest Manual!**

IOTA News

Record-holders who have made IOTA contacts in an IOTA contest after 2003, can claim credit for them without submitting QSLs, provided that the contact details match. Go to https://iota-world.org/, log in, select "Add Contest QSOs" under the "My IOTA" tab, and then upload your .cbr or .log file(s). The logs for the IOTA Contest 2018 island stations have now been added to the IOTA database and are available for QSO matching.
IOTA Management is "waiting for further information from 9M2SDX, B4/BY1AA, B4/BY1OK, BD4SDX, BD7PCA, BG5BAA, BG5BRT, BH4BQI, BY7KP, HS5NMF, J49A and YB9QP before these activations can be accepted".

WSJT-X 2.0

A fifth candidate release ("RC5") of WSJT-X 2.0 has been available for download and use by beta testers since 26 November. The "Quick-Start Guide to WSJT-X 2.0" has been updated, and must be read thoroughly before using RC5 http://physics.princeton.edu/pulsar/k1jt/Quick_Start_WSJT-X_2.0.pdf
"RC5 is stable, works well, and fixes the known problems in RC4. It is likely that the General Availability (GA) release of WSJT-X 2.0, scheduled for 10 December, will be nearly identical to RC5. We recommend using RC5 (and therefore the v2.0 FT8 protocol) in the conventional FT8 sub-bands at audio TX frequencies 2000 Hz and higher. Inevitably the necessary transition from v1.x to v2.0 protocols for FT8 and MSK144 will cause some confusion and cross-protocol interference. Users of v1.9.1 and earlier are unable to decode transmissions from users of RC4 and
later, and vice-versa.

As more users upgrade their software to WSJT-X 2.0 - and particularly after the General Availability (GA) release on 10 December - the new protocol should start to dominate the conventional FT8 sub-bands. As soon as possible after 10 December, and certainly by 1 January 2019, everyone should be using WSJT-X 2.0 or a compatible v2.0 version of derivative programs such as JTDX or MSHV".
Download links for RC5 on Windows, Linux, and macOS can be found on the WSJT-X web page http://physics.princeton.edu/pulsar/k1jt/wsjtx.html.

African DX

Contacts with stations on the African continent count towards the SARL's All Africa Award (www.sarl.org.za/public/awards/awards.asp)
The Gambia, C5. Andre, ON7YK is active as C5YK until 9 March 2019. Activity is on 60 to 10 meters using FT8, with some CW and SSB. QSL to home call after 15 March 2019.

Burkina Faso, XT. Al, F8FUA will be active as XT2BR from Ouagadougou from 2 to 11 December. Activity will be on the HF bands using CW, SSB and various digital modes. QSL to home call.

Gabon, TR. Roland, F8EN, who has just turned 90, will be active again as TR8CR from Gabon starting on 16 December for three months. He will operate CW and SSB on 40 to 17 m, maybe also on 80 m. QSL via F6AJA, direct or bureau; see http://LesNouvellesDX.fr/voirlogs.php for log search.

Namibia, V5 and Botswana, A2. Carl, ZS1KM is planning an "Overland/DX trip" and will be travelling through Namibia to Botswana between mid-December and mid-January 2019. Along the way he will be active as V51KM and A25KM on 80, 40 and 20 metres mainly SSB with some digital.

African Islands

IOTA frequencies
CW: 28 040 24 920 21 040 18 098 14 040 10 114 7 030 3 530 kHz
SSB: 28 560 28 460 24 950 21 260 18 128 14 260 7 055 3 760 kHz
Senegal, 6W. The annual 6V1A expedition to the island of Goree (AF-045) will be conducted between 7 to 9 December. Tafa, 6W1KI, Ouzin, 6W1PZ, Jul, 6W1QL, John, 6W7JX and others will operate SSB and CW on various bands with two stations. PayPal 6v1a.aras@gmail.com for a direct QSL.

Sierra Leone, 9L. The website for the 9 to 21 January 2019 9LY1JM DXpedition to Banana Island (AF-037), Sierra Leone is now under construction at https://9l2019dx.wordpress.com/. The team so far includes Andreas, DL3GA, Jean-Luc, F1ULQ, Patrick, F2DX, Frank, F4AJQ, Jimi, F4DLM, Frank, F5TVG, Herman, ON4QX and Eric, ON7RN. Plans are for 12 operators to be active on 160-10 metres CW, SSB, RTTY, PSK and FT8 (Fox and Hound mode) with four stations. QSL via Club Log's OQRS, LoTW or via F5GSJ (direct or bureau).

Looking for a DXCC Entity?

Operators looking for a particular DX entity should check websites listing DX "planned operations" and be on for the CQWW. One such website by NG3K provides a CQ WW-specific page www.ng3k.com/misc/cqc2018.html. Special prefixes or call signs are sometimes used in contests and becoming familiar with them beforehand can save time in the contest.

ARRL Contestsing

Contests.arrl.org (http://contests.arrl.org/) is the new place for everything about ARRL Radio Contests! The new website will organize the information by contest, with single click access to a particular event's rules, results, lists of logs received, and so on. According to *The ARRL Letter*, "... the previous Contest Results Articles web page www.arrl.org/contest-results-articles, which offers current and historical results dating back some 20 or more years, will be known as the "legacy site" going forward."

AGM 2018

On Saturday 10 November the 2018 AGM was held at the premises of the SAIEE was again.

The venue was, as usual, well prepared and of course the Museum attracted a lot of attention as it usually does. A few newcomers and new members to the AWA attending their first AGM were really impressed with the static displays that have been so well arranged and laid out, and of course the shack was the main meeting point for all to see.

The meeting kicked off at 10:00 and was attended by 38 members. This is an all time record and 8 more than attended the AGM last year. It was so good to see so many people attending and of course our thanks go to those who travelled a fair distance to join us. Our esteemed president, John ZS1WJ, came up from Cape Town to join us and of course Don ZS5DR from KZN. The rest were all from Div 6 , but still had to travel a fair distance to be with us.

One of the attractions this year was the "Dungeon", which was opened up to us by Oliver ZS6OG, to view many of the additional bita and pieces that had either not been placed in the Museum, or will still being cleaned up and catalogued

As per the AWA Rules of Association (Constitution) the elected committee from 2017 would still serve another year up to 2019 AGM where voting would take place again.

During the AGM, it was noted that our membership had grown to 307 members from the previous year 266.

Daryl ZS6DLL, was awarded the Geoff Wright SK floating trophy for having contributed the most to CW during the year.

After starting a CW Class on the internet and assisting 5 hams to get their CW going, it was a worthy achievement .

38 tickets for the Book on Valve Amplifiers by Joh Fielding ZS5JF, which was donated by Rad ZS6RAD, were sold in total. The draw for the book was done at the AGM and the winner was John ZS1WJ.

After the main meeting, Rad ZS6RAD, gave a short talk on Neutralization of valves in a tube rig. This was also one of the discussion points on a Saturday morning SSB net, which was taken a bit further and more fully explained, as well as placed in the previous Newsletter.

After the Main meeting was completed, all gathered outside for a group photo, and then the fires were lit for the bring and braai, which also was well attended and much conversation around the fire and the ensuing lunch was held.

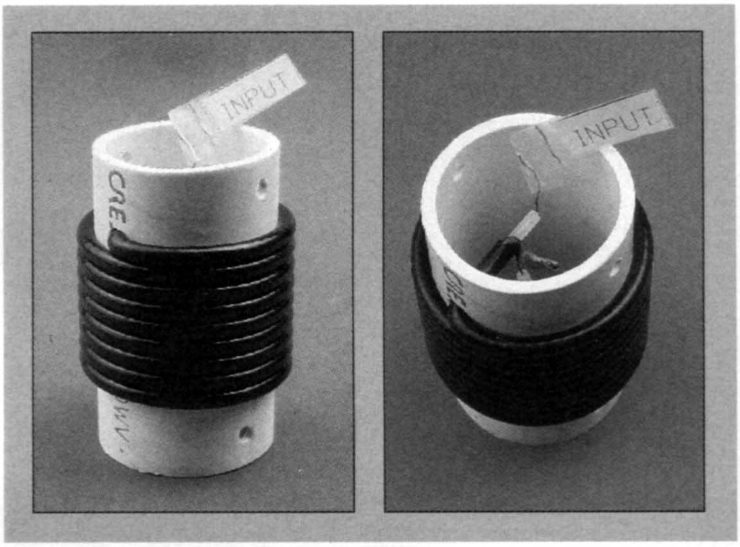
After all the festivities and much talking of various subjects, greetings were passed on by all and slowly but surely the SAIEE returned to normal.

Hopefully our next AGM will also be able to be held in this fantastic venue and our thanks go to the Management and team of the SAIEE for allowing us this opportunity to make use of their facilities.

A few photos of the attendees at the main meeting, 38 in all, inside the main hall at the SAIEE.

The Braai held afterwards attracted man of the participants and much conversation was held around many different subjects.

Two New Multiband Trap Dipoles



W8NX details a new coax trap design used in two multi band antennas; one covering 80, 40, 20, 15 and 10 meters, and the other covering 80, 40, 17 and 12 meters.

Over the last 60 or 70 years, amateurs have used many kind of multiband antennas to cover the traditional HF bands. The availability of the 30, 17 and 12-meter bands has expanded our need for multiband antenna coverage. A fortunate few have the space and resources for multiband antennas like rhombics or long Vs, but many hams have employed inverted-L long wires or parallel dipoles. Old-timers will recall the off center-fed Windom of the '30s-the first version using a single-wire transmission line, and the later design using two-wire feed line. Over the years, random-length dipoles with open-wire feeders and associated tuners have been used successfully a multi band antennas. The G5RV multi band antenna is a specialized example of this approach.'

The log periodic array represents a kind of brute-force approach to the goal of achieving coverage of multiple HF ham bands. It seems inefficient because of the large gaps between our relatively narrow amateur HF bands.

Over the last few decades, two factor have affected the development of multiband antennas-the popularity of low impedance (usually 50-0) coaxial feed lines, and the appearance of untuned, 50-0 solid-state amplifiers. The impedance of an antenna is relatively low only at its fundamental frequency and at odd-order harmonics. Although antenna tuners are often necessary to resonate an antenna system, the quest for expanded multiband coverage with simple antennas continues.

At the end of the 1930s, a different technological approach appeared in the form of resonant traps in antennas. The Mims Signal Squirter is the grandfather of modern day tribanders.? This article discusses in detail an innovative trap design employed in two multi band dipole

One W8NX Trap Design-Two Multiband Dipole

Two different antennas are described here. The first covers 80, 40, 20, 15 and 10 meters, and the second covers 80, 40, 17 and 12 meters. Each uses the same type of W8NX trap-connected for different modes of operation-and a pair of short capacitive stubs to enhance coverage. Both antennas were designed using my "All About Trap Dipoles" software package.! The new W8NX coaxial-cable trap have two different modes: a high- and a low-impedance mode. The inner-conductor windings and shield windings of the traps are connected in series in the conventional manner for both modes. However, either the low- or high-impedance point can be used as the trap's output terminal. For low-impedance trap operation, only the center conductor turns of the trap windings are used. For high-impedance operation, all turns are used, in the conventional manner for a trap. The short tubs on each antenna are strategically sized and located to permit more flexibility in adjusting the resonant frequencies of the antenna.

Figure I shows the configuration of the 80, 40, 20, 15 and 10-meter antenna. The radiating elements are made of #14 stranded copper wire. The element lengths are the wire span lengths in feet. These lengths do not include the lengths of the pigtails at the balun, traps and insulators. The 32.3-foot-long inner 40-meter segments are measured from the eyelet of the input balun to the tension relief hole in the trap coil form. The 4.9-foot segment length is measured from the tension relief hole in the trap to the 6-foot stub. The 16.I-foot outer-segment span is measured from the tub to the eyelet of the end insulator. The coaxial-cable traps are wound on PVC pipe coil forms and use the low-impedance output connection. The stubs are 6-footlength of 1/8 -inch stiffened aluminum or copper rod hanging perpendicular to the radiating elements. The first inch of their length is bent 90° to permit attachment to the radiating elements by large-diameter copper crimp connectors. Ordinary #14 wire may be used for the stubs, but it has a tendency to curl up and may tangle unless weighed down at the end. I recommend that you feed the antenna with 75-0 coax cable using a good 1: 1 balun.

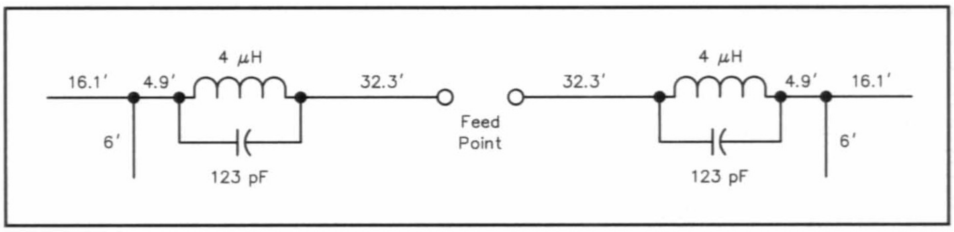


Figure 1—A W8NX multiband dipole for 80, 40, 20, 15 and 10 meters. The values shown (123 pF and 4 µH) for the coaxial-cable traps are for parallel resonance at 7.15 MHz. The low-impedance output of each trap is used for this antenna.

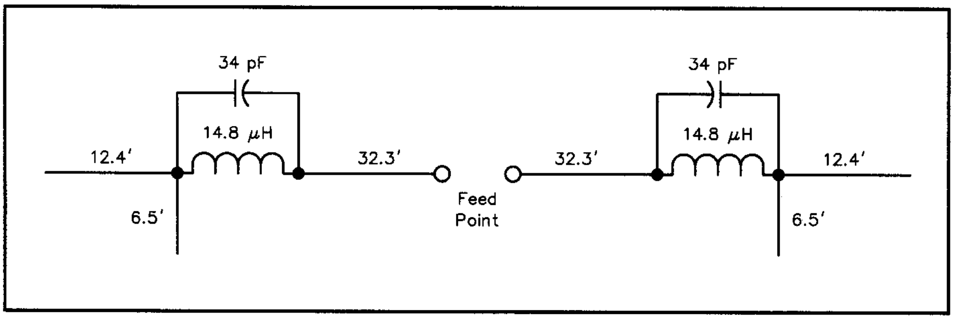


Figure 2—A W8NX multiband dipole for 80, 40, 17 and 12 meters. For this antenna, the high-impedance output is used on each trap. The resonant frequency of the traps is 7.15 MHz.

This antenna may be thought of as a modified W3DZZ antenna? (shown for many years in various ARRL publications) with the addition of capacitive stubs. The length and location of the stub give the antenna designer two extra degrees of freedom to place the resonant frequencies within the amateur bands. This additional flexibility is particularly helpful to bring the 15 and lO-meter resonant frequencies to more desirable locations in these bands. The actual 10-meter resonant frequency of the W3DZZ antenna is somewhat above 30 MHz, pretty remote from the more desirable low frequency end of 10 meters.

Figure 2 shows the configuration of the 80, 40, 17 and 12-meter antenna. Notice that the capacitive stubs are attached immediately outboard after the traps and are 6.5 feet long, 0.5 foot longer than those used in the other antenna. The traps are the same as those of the other antenna, but are connected for the high-impedance output mode. Since only four bands are covered by this antenna, it is easier to fine tune it to precisely the desired frequency on all bands. The 12.4-foot tips can be pruned to a particular 17 -meter frequency with little effect on the 12-meter frequency. The stub lengths can be pruned to a particular 12-meter frequency with little effect on the 17-meter frequency. Both such pruning adjustments slightly alter the 80-meter resonant frequency. However, the bandwidths of the antennas are so broad on 17 and 12 meters that little need for such pruning exists. The 40-meter frequency is nearly independent of adjustments to the capacitive stubs and outer radiating tip elements. Like the first antennas, this dipole is fed with a 75-Q balun and feed line.

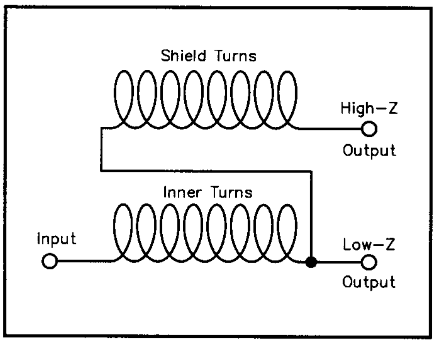


Figure 3—Schematic for the W8NX coaxial-cable trap. RG-59 is wound on a 2³/₈-inch OD PVC pipe.

Figure 3 shows the schematic diagram of the traps. It explains the difference between the low and high-impedance modes of the traps. Notice that the high-impedance terminal is the output configuration used in most conventional trap applications. The low-impedance connection is made across only the inner conductor turns, corresponding to one-half of the total turns of the trap. This mode steps the trap's impedance down to approximately one-fourth of that of the high-impedance level. This is what allows a single trap design to be used for two different multi band antennas.

Figure 4 is a drawing of a cross-section of the coax trap shown through the long axis of the trap. Notice that the traps are conventional coaxial-cable traps, except for the added low-impedance output terminal. The traps are 83/4 close-spaced turns of RG -59 (Belden 8241) on a 23/8-inch-OD PVC pipe (schedule 40 pipe with a 2-inch ID) coil form. The forms are 41/8 inches long. Trap resonant frequency is very sensitive to the outer diameter of the coil form, so check it carefully. Unfortunately, not all PVC pipe is made with the same wall thickness. The trap frequencies should be checked with a dip meter and general coverage receiver and adjusted to within 50 kHz of the 7150 kHz resonant frequency before installation. One inch is left over at each end of the coil forms to allow for the coax feed-through holes and holes for tension-relief attachment of the antenna radiating elements to the traps. Be sure to seal the ends of the trap coax cable with RTV sealant to prevent moisture from entering the coaxial cable.

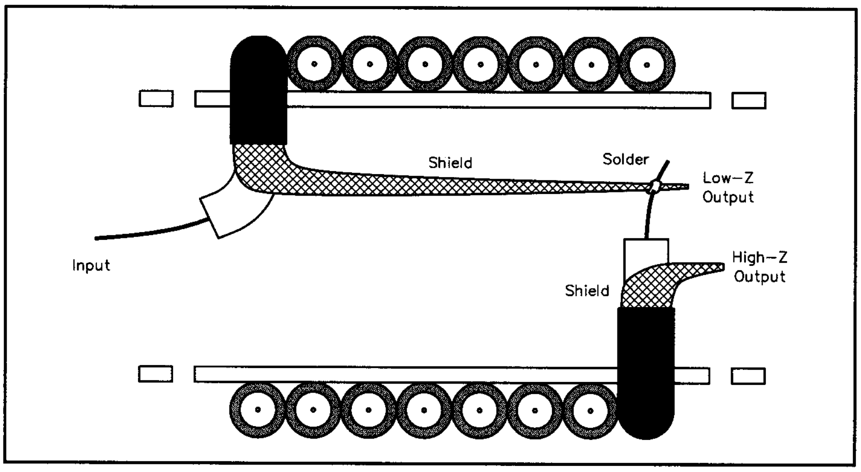


Figure 4—Construction details of the W8NX coaxial-cable trap.

Also, be sure that you connect the 32.3-foot wire element at the start of the inner conductor winding of the trap. This avoids de tuning the antenna by the stray capacitance of the coaxial-cable shield. The trap output terminal (which has the shield stray capacitance) should be at the outboard side of the trap. Reversing the input and output terminals of the trap will lower the 40-meter frequency by approximately 50 kHz, but there will be negligible effect on the other bands.

The title-page photos show a coaxial cable trap. Details of the trap installation are shown in Figure 5. This drawing applies specifically to the 80, 40, 20, 15 and 10-meter antenna, which uses the low impedance trap connections. Notice the lengths of the trap pigtails: 3 to 4 inches at each terminal of the trap. If you

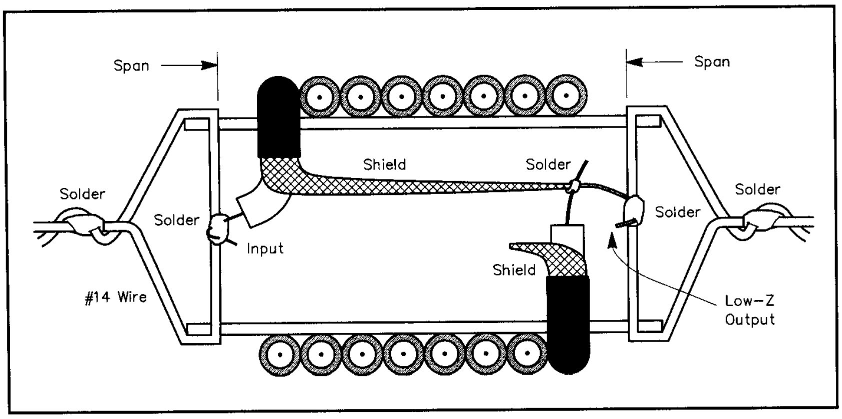


Figure 5—Additional construction details for the W8NX coaxial-cable trap.

use a different arrangement, you must modify the span lengths accordingly. All connections can be made using crimp connectors rather than by soldering. Access to the trap's interior is attained more easily with a crimping tool than with a soldering iron.

Antenna Patterns

The performance of both antennas has been very satisfactory. I am currently using the 80, 40, 17 and l2-meter version because it covers 17 and 12 meters. (I have a tribander for 20, 15 and 10 meters.) The radiation pattern on 17 meters is that of 3/2-wave dipole. On 12 meters, the pattern is that of a 512-wave dipole. At my location in Akron, Ohio, the antenna runs essentially east and west. It is installed as an inverted V, 40 feet high at the center, with a 120° included angle between the legs. Since the stubs are very short, they radiate little power and make only minor contributions to the radiation patterns. The pattern has four major lobes on 17 meters, with maxima to the northeast, southeast, southwest, and northwest. These provide low-angle radiation into Europe, Africa, South Pacific, Japan and Alaska. A narrow pair of minor broadside lobes provides north and south coverage into Central America, South America and the polar regions.

There are four major lobes on 12 meters, giving nearly end-fire radiation and good low-angle east and west coverage. There are also three pairs of very narrow, nearly broadside, minor lobes on 12 meters, down about 6 dB from the major end-fire lobes. On 80 and 40 meters, the antenna has the usual figure-8 patterns of a half-wavelength dipole. I have some pattern distortion and input impedance effects from aluminium siding on my house. Nevertheless, DX is easily workable on either of these antennas using a 100- W transceiver, when the high-frequency bands are open.

Both antennas function as electrical half-wave dipoles on 80 and 40 meters with a low SWR. They both function as odd harmonic current-fed dipoles on their other operating frequencies, with higher, but still acceptable, SWR. The presence of the stubs can either raise or lower the input impedance of the antenna from those of the usual third and fifth harmonic dipoles. Again, I recommend that 75-Q, rather than 50-Q, feed line be used because of the generally higher input impedances at the harmonic operating frequencies of the antennas.

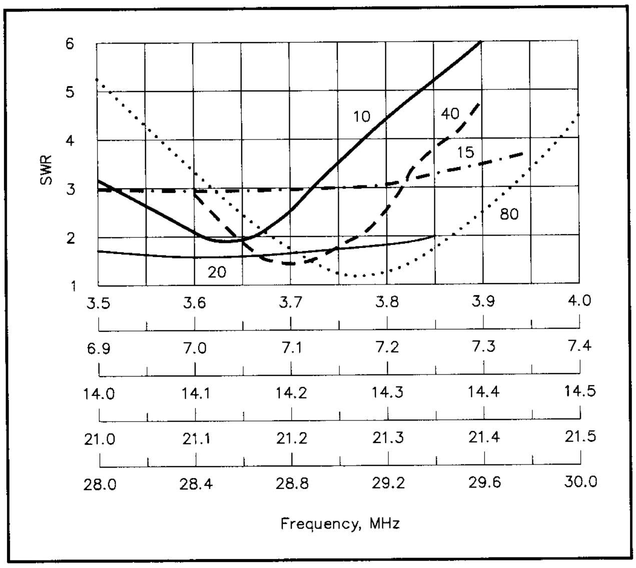


Figure 6—Measured SWR curves for an 80, 40, 20, 15 and 10-meter antenna, installed as an inverted-v with 40-ft apex and 120° included angle between legs.

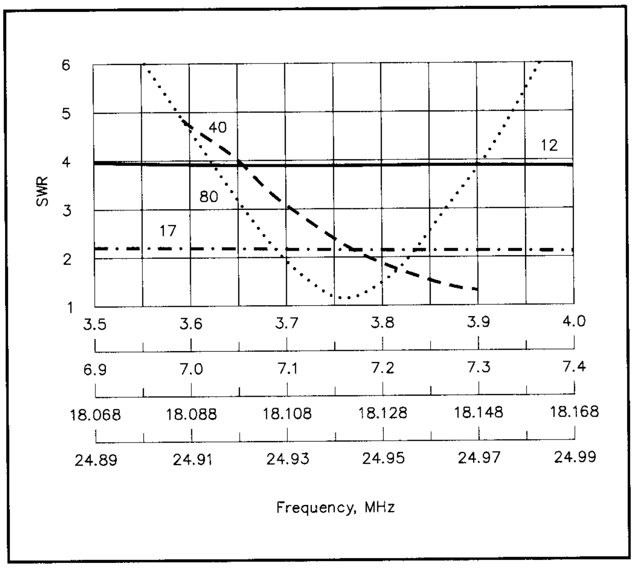


Figure 7—Measured SWR curves for an 80, 40, 17 and 12-meter antenna, installed as an inverted-v with 40-ft apex and 120° included angle between legs.

The SWR curves of both antennas were carefully measured. A 75 to 50-0 transformer from Palomar Engineers was inserted at the junction of the 75-0 coax feed line and my 50-0 SWR bridge. The transformer prevents an impedance discontinuity, with attendant additional undesired line reflections appearing at the 75 to 50-0 junction. The transformer is required for accurate SWR measurement if a 50-0 SWR bridge is used with a 75-0 line. No harm is done to any equipment, however, if the transformer is omitted. Most 50-0 rigs operate satisfactorily with a 75-0 line, although this requires different tuning and load settings in the final output stage of the rig or antenna tuner. I use the 75 to 50-0 transformer only when making SWR measurements and at low power levels. The transformer is rated for 100 W, and when I run my l-kW PEP linear amplifier the transformer is taken out of the line. (I hope my absent-mindedness doesn't catch up with me some day!)

Figure 6 gives the SWR curves of the 80,40,20, 15 and 10-meter antenna. Minimum SWR is nearly 1: 1 on 80 meters, 1.5: 1 on 40 meters, 1.6: 1 on 20 meters, and 1.5: 1 on 10 meters. The minimum SWR is slightly below 3:1 on 15 meters. On 15 meters, the stub capacitive reactance combines with the inductive reactance of the outer segment of the antenna to produce a resonant rise that raises the antenna input resistance to about 220 0, higher than that of the usual 312-wavelength dipole. An antenna tuner may be required on this band to keep a solid-state final output stage happy under these load conditions.

Figure 7 shows the SWR curves of the 80,40,17 and 12-meter antenna. Notice the excellent 80-meter performance with a nearly unity minimum SWR in the middle of the band. The performance approaches that of a full-size 80-meter wire dipole. The short stubs and the very low inductance traps shorten the antenna somewhat on 80 meters. Also, observe the good 17 -rneter performance, with the SWR being only a little above 2: 1 across the band.

But notice the 12-meter SWR curve of this antenna, which shows 4: 1 SWR across the band. The antenna input resistance approaches 300 Q on this band because the capacitive reactance of the stubs combines with the inductive reactance of the outer antenna segments to give resonant rises in impedance. These are reflected back to the input terminals. These stub-induced resonant impedance rises are similar to those on the other antenna on 15 meters, but are even more pronounced.

Too much concern must not be given to SWR on the feed line. Even if the SWR is as high as 9: 1, no destructively high voltages will exist on the transmission line. Recall that transmission-line voltages increase as the square root of the SWR in the line. Thus, 1 kW of RF power in 75-Q line corresponds to 274 V line voltage for a 1: 1 SWR. Raising the SWR to 9: 1 merely triples the maximum voltage that the line must withstand to 822 V. This voltage is well below the 3700-V rating ofRO-II, or the 1700- V rating of RO-59, the two most popular 75-Q coax lines. Voltage breakdown in the traps is also very unlikely. As will be pointed out later, the operating power levels of these antennas are limited by RF power dissipation in the traps, not trap voltage breakdown or feed-line SWR.

Trap Losses and Power Rating

Table 1 presents the results of trap Q measurements and extrapolation by a twofrequency method to higher frequencies above resonance. I employed an old, but recently calibrated, Boonton Q meter for the measurements. Extrapolation to higher frequency bands assumes that trap resistance losses rise with skin effect according to the square root of frequency, and that trap dielectric losses rise directly with frequency. Systematic measurement errors are not increased by frequency extrapolation. However, random measurement errors increase in magnitude with upward frequency extrapolation. Results are believed to be accurate within 4% on 80 and 40 meters, but only within 10 to 15% at 10 meters. Trap Q is shown at both the high- and low impedance trap terminals. The Q at the low impedance output terminals is 15 to 20% lower than the Q at the high-impedance output terminals.

Table 1
Trap Q

Frequency (MHz)	3.8	7.15	14.18	18.1	21.3	24.9	28.6
High Z out (Ω)	101	124	139	165	73	179	186
Low Z out (Ω)	83	103	125	137	44	149	155

Table 2A
Trap Loss Analysis: 80, 40, 20, 15, 10-Meter Antenna

Frequency (MHz)	3.8	7.15	14.18	21.3	28.6
Radiation Efficiency (%)	96.4	70.8	99.4	99.9	100.0
Trap losses (dB)	−0.16	−1.5	−0.02	−0.01	−0.003

Table 2B
Trap Loss Analysis: 80, 40, 17, 12-Meter Antenna

Frequency (MHz)	3.8	7.15	18.1	24.9
Radiation Efficiency (%)	89.5	90.5	99.3	99.8
Trap losses (dB)	−0.5	−0.4	−0.03	−0.006

I computer-analysed trap losses for both antennas in free space. Antenna-input resistances at resonance were first calculated, assuming lossless, infinite-Q traps. They were again calculated using the Q values shown in Table 1. The radiation efficiencies were also converted into equivalent trap losses in decibels. Table 2A summarizes the trap loss analysis for the 80, 40, 20, 15 and 10-meter antenna and Table 2B for the 80,40,17 and 12-meter antenna.

The loss analysis shows radiation efficiencies of 90% or more for both antennas on all bands except for the 80, 40, 20, 15 and 10-meter antenna when used on 40 meters. Here, the radiation efficiency falls to 70.8%. A l-kW power level at 90% radiation efficiency corresponds to 50- W dissipation per trap. In my experience, this is the trap's survival limit for extended key-down operation. SSB power levels of I kW PEP would dissipate 25 W or less in each trap. This is well within the dissipation capability of the traps.

When the 80, 40, 20, IS and 10-meter antenna is operated on 40 meters, the radiation efficiency of 70.8% corresponds to a dissipation of 146 W in each trap when I kW is delivered to the antenna. This is sure to burn out the traps-even if sustained for only a short time. Thus, the power should be limited to less than 300 W when this antenna is operated on 40 meters under prolonged key-down conditions. A 50% CW duty cycle would correspond to a 600- W power limit for normal 40-meter CW operation. Likewise, a 50% duty cycle for 40-meter SSB corresponds to a 600-W PEP power limit for the antenna.

I know of no analysis where the burnout wattage rating of traps has been rigorously determined. Operating experience seems to be the best way to determine trap burn-out ratings. In my own experience with these antennas, I've had no traps burn out, even though I operated the 80, 40, 20, 15 and 10-meter antenna on the critical 40-meter band using my AL-80A linear amplifier at the 600- W PEP output level. I have, however, made no continuous, key-down, CW operating tests at full power purposely trying to destroy the traps!

Summary

Some hams may suggest using a different type of coaxial cable for the traps. The de resistance of 40. 7 n per I 000 feet of RG-59 coax seems rather high. However, I've found no coax other than RG-59 that has the necessary inductance-to-capacitance ratio to create the trap characteristic reactance required for the 80, 40, 20, 15 and 10-meter antenna. Conventional traps with wide-spaced, open-air inductors and appropriate fixed-value capacitors could be substituted for the coax traps, but the convenience, weatherproof configuration and ease of fabrication of coaxial-cable traps is hard to beat.

Notes

1L. Varney, "The G5RV Multiband Antenna ...

Up-to-Date," The ARRL Antenna Oompendtum, Vol. 1, P 86.

2M. Mims, "The Mims Signal Squirter," QST, Dec1939,p12.

3Available from AI Buxton, W8NX, PO Box 174, Columbus, OH 43216; Price: $24.95 plus $5 for shipping. Specify 3.5 or 5.25-inch floppy disk.

4 "Five Band Antenna," The ARRL Antenna Book, 16th Edition, pp 7-10 to 7-11.

Al Buxton is no stranger to the pages of QST. He was first licensed in 1937 as W7GLC, and has had a distinguished career in both industry and academia. Now retired, Al is active in Amateur Radio and computer application studies in antenna development. This article continues a series on transmission lines, antenna traps and trap-dipole antennas.

AWA Open Day Rand Airport—2008

CONTACT US:

P.O. Box 12320
Benoryn
1504

Mobile: 082 448 4368
Email: andyzs6ady@vodamail.co.za

Get your backdated issues at
http://www.awasa.org.za/index.php/newsletters

Visit our Website:
www.awasa.org.za

Antique Wireless Association of Southern Africa

Mission Statement

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yester-days radio's and associated equip-ment. To encourage all like minded amateurs to do the same thus ensur-ing the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association. Join by logging in to our website.

Notices:

Net Times and Frequencies (SAST):

Saturday 06:00 (04:00 UTC) —AM Net—3615
Saturday 07:00 (05:00 UTC) —Western Cape SSB Net— 3630
Saturday 08:30 (06:30 UTC)— National SSB Net— 7140; Sandton repeater 145.700
Echolink—ZS0AWA-L; ZS6STN-R
Relay on 3615 for those having difficulty with local skip conditions.
Saturday 14:00 (12:00 UTC)— CW Net—7020; (3550 after 15 min if band conditions not good on 40)
Wednesday 19:00 (17:00 UTC) — AM Net—3615, band conditions permitting.

Barlow Wadley for Sale Durban area:

My name is Saleem, I'm from Durban, and I have my late fathers Barlow Wadley XCR30 Mk2. I would like to sell it but don't know where...maybe someone here knows or is interested in it themselves.
From what I remember, my father said he needed a part to get it working properly again.

Asking R700 neg.

My number: +27 71 773 9909
I prefer contact via email , sms or even Whatsapp as I'm sometimes too busy to answer the phone.
My Whatsapp no 0739818941